

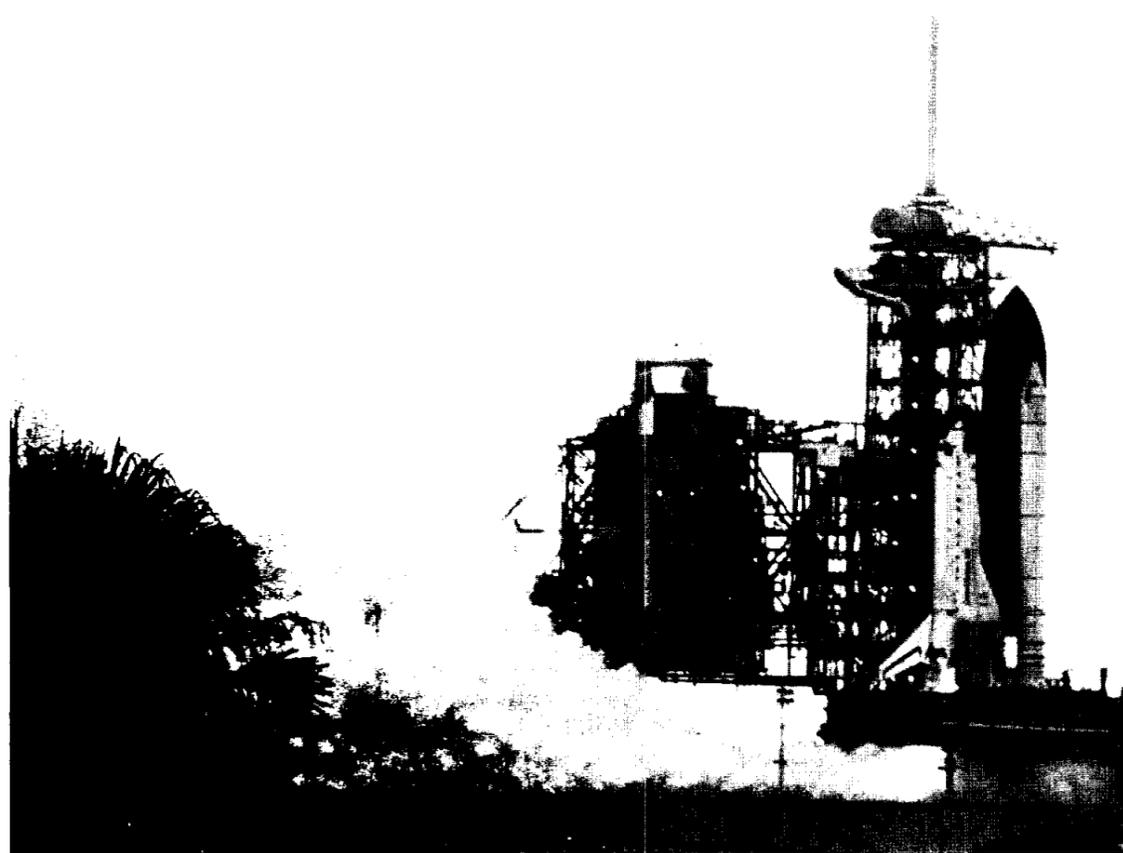


Space News Roundup

Vol. 27

August 12, 1988

No. 22



Discovery's three main engines come alive Wednesday on Kennedy's Pad 39B in a 22-second flight readiness firing.

Discovery's test firing big stride

Discovery came alive Wednesday in a blazing, near-perfect 22-second test firing of the main engines that moves STS-26 a major step closer.

"We really had a super test," Robert Crippen, NSTS Operations deputy director, said after the Flight Readiness Firing (FRF). "The final, real, mainline thing we were after was to test the total launch system ... and it works well. We have a well-oiled team and set of equipment that make me feel very comfortable to go execute STS-26."

Data from the FRF is still being reviewed, and engineers will be inspecting Discovery's main engines for about two weeks. Complete results will not be known until the checks are finished.

"Congratulations on a super job by a super team," said NASA Administrator James C. Fletcher, at Kennedy for the test. "I can't begin to say how well everything's been going."

The main engines ignited in sequence on target at about 6:30 a.m. CDT following an all-night countdown, and preliminary results indicate the test was highly successful. "It was a very smooth countdown and it led to a very smooth operation. The engines performed flawlessly, and there were no surprises," said Thomas Utsman, director of Shuttle Management and Operations at Kennedy. During a built-in countdown hold at T-minus 3 hours, a liquid oxygen loading console "crashed" in the firing room, but

controllers moved to a back-up console and recovered operations in 22 minutes, he said.

A small problem with nitrogen leaking into the Orbiter's 17-inch disconnect cavity, normally kept pressurized only with helium, was indicated by instruments. However, the data could be incorrect or irrelevant because it is from sensors never before put on an Orbiter, Utsman said. "It will take more engineering review over a week or so to really understand. It is really the only thing coming out of the test with any uncertainty."

"We really don't think it's going to be a problem," Crippen added.

Crippen, who chairs the Mission Management Team (MMT) that must give a final, unanimous "go" at T-minus 9 minutes for a launch to proceed, said no waivers of any launch commit criteria were issued during the FRF countdown. It was the second try at an FRF after an original attempt was halted just before ignition by a computer reading of a faulty valve.

Engineers replaced the propellant bleed valve in less than the expected time, and as a result the FRF was held one day earlier than originally estimated. Problems with the first FRF attempt only prove the necessity of tests, Crippen said. "We knew we would have growing pains, and that's why we elected to do these tests."

Please see **FIRING**, Page 4



JSC cheers crucial milestone

Spirits continue to rise at JSC as the impending return of Americans to space looms visibly closer following Wednesday's successful test of Discovery's engines.

"The FRF is a major step toward the upcoming mission, and I want to congratulate everyone at our center on its success," JSC Director Aaron Cohen said. "The test firing has been the product of months of work, and the way to the return to flight is growing smoother daily thanks to the professionalism and dedication of the NASA team."

Tommy Holloway, Mission Operations return to flight manager, said the

test has made anticipation of STS-26 grow. "Obviously, this is one of those crucial milestones which brings us that much closer to returning to the business of flying Space Shuttles," Holloway said. "That's what we're here for, and that, more than anything, is what motivates and excites our people."

The successful execution of the FRF builds confidence in the work accomplished during the past two and a half years, Director of Engineering Henry Pohl said. "I thought it came off very, very well; it was very professional, it was very smooth," he said. "I was a little bit concerned about

having a lot of new people on the consoles. We've got a lot of new procedures. We've got a lot of new hardware. To get all of that to play together is a major undertaking. And it all worked very well."

Although the test appeared perfect, it will be a little longer "before we're really past the FRF," Pohl added. "You've got to have a couple of weeks to sift through the data of the FRF. We're a long ways from being free, and we've got an awful lot of work to go. But every time something goes right, that's one thing you don't have to worry about."

Please see **CRUCIAL**, Page 4

Congress approves \$10.7 billion budget for NASA

Both the House and Senate approved a compromise 1989 funding bill Tuesday that includes \$10.676 billion for NASA, including \$900 million for Space Station Freedom.

The bill, which passed 373-30 in the House and 88-8 in the Senate, now goes to the White House for President Reagan's signature.

NASA is allowed to spend only \$385 million on Space Station before May 15, 1989, giving the new president a chance to review the program once he assumes office. The bill also provides for a \$100 million transfer from the Department of Defense—if such a transfer is in the Defense appropriations bill—for unanticipated Shuttle

requirements. The NASA budget was contained in a conference committee agreement on the Housing and Urban Development and Independent Agencies appropriations bill.

An agencywide breakdown of the funding measure shows that research and development will receive \$4.192

billion; space flight, control and data communication will receive \$4.364 billion, construction of facilities will have \$290 million, and research and program management will get \$1.855 billion.

Clyde Lowrimore, head of JSC's Central Budget Office, said the center has not yet received its fiscal 1989 budget breakdown from Headquarters.

The construction budget is expected to include \$4.9 million for modifications to the Atmospheric Reentry Materials and Structures Evaluation Facility in Bldg. 222, and \$7.8 million for JSC to build an Auxiliary Chiller Facility north of Bldg. 35 for air conditioning, said Dick Thompson, chief of the Facilities Design Division.

If you've lost it, he's found it

JSC worker takes lost and found job seriously

By James Hartsfield

On any given day, Cecil Henderson finds his JSC office strewn with more than 100 pairs of sunglasses. And keys, hundreds of keys, with no lock to turn.

"They're by far the most common. People always lose sunglasses and keys," Henderson says, sifting through a jingling, multi-colored pile, a bit forlorn. "A government key I can track down in minutes. But these others ..."

A bright Bugs Bunny puppet with a permanent smile. A portable television with AM-FM stereo. A bright orange Indian headdress with tangled feathers. If it can be lost, it can be found, Henderson says.

"There's no limitation as to what's turned in," he says. "And I take everything serious. You can't ever tell what somebody wants. If something's got some kind of identifying mark, I can find the owner. I'll make every effort. But some of these things, you just can't really tell."

Caps, shirts, pants, jackets and coats and scarfs and shoes. Baby shoes. Baby buggies. Cameras, lens caps, film, all makes and models. The relics of tourism, of more than 1 million tourists a year—26,000 last week. Once a week, the visitors' center sends Henderson a box of homeless articles.

"There are some items that are highly sentimental to some people.

So many sentimental items that are lost. There have been times that I have traveled and I have lost some items, nothing very important, but I can imagine. I don't know if people are aware they've lost things or not. If it was me, I'd know," Henderson sighs. "If I get a call, or if it's got just any kind of identifying something, I'll track them down."

Wallets, credit cards, purses, traveler's checks, airline tickets, cash. Birth certificates. Land deeds. Passports. Karl Malden's worst nightmares come true.

"There are some real sad stories, like this lady from Mexico last week, lost \$380 in traveler's checks. I had

Please see **LOST**, Page 4



Cecil Henderson displays some of the usual and unusual objects that have been turned in to the lost and found office.

JSC Photo by Mark Sowa

JSC People

Life sciences awards

The Space and Life Sciences Division honored employees for outstanding work at its fourth quarter awards ceremony. The awards included: Dr. David K. Broadwell, Dr. Patricia A. Santy, Dr. Richard T. Jennings, Constance R. Alexander, Richard L. Sauer and Dane Russo, Ph.D., Sustained Superior Performance Awards; Ernesto Schofield and Dr. Joseph Degioanni, Special Achievement Awards; Tandi Bagian, Suggestion Award; James Rippey, Man-Systems Division Suggestion Award; Charles D. Harris, Jr., Sustained Superior Performance Award for the Life Sciences Project Division.

Petrovics gets award

Mary F. Petrovics, a secretary who supports the Space Science Branch of the Solar System Exploration Division, has received the Marilyn J. Bocking Secretarial Award for July.

Petrovics was presented a plaque and \$500 for her superior work by JSC Director Aaron Cohen. Recently, she coordinated travel plans, security clearances and hardware shipment for a major field measurement program in the Indian Ocean.



Petrovics

JSC

Dates & Data

Today

MAES banquet—The NASA area professional chapter of the Mexican American Engineering Society (MAES) will hold its fifth annual scholarship banquet at the University of Houston tonight. A social hour will begin at 7 p.m. followed by dinner and the program at 8 p.m. For more information, contact Dalia Riojas, x33815, or Mary Flores, x37284.

Cafeteria menu—Entrees: Tuna and noodle casserole, roast beef with dressing, deviled crabs, liver and onions, seafood gumbo. Vegetables: whipped potatoes, peas, cauliflower.

Monday

Cafeteria menu—Entrees: Breaded cutlet (special), Polish sausage with German potato salad, beef chop suey, French onion soup. Vegetables: okra and tomatoes, green peas.

Tuesday

EAA badging—Dependents and spouses may apply for photo identification badges between 6:30-8:30 p.m. in the Rec Center.

Cafeteria menu—Entrees: fried chicken (special), shrimp creole, Salisbury steak, split pea soup. Vegetables: mixed vegetables, beets, whipped potatoes.

Wednesday

Cafeteria menu—Entrees: stuffed bell pepper (special), shrimp salad, wieners and beans, barbecue plate, fried catfish with hush puppies, seafood gumbo. Vegetables: corn O'Brien, rice, Italian green beans.

Thursday

NCMA workshop—The Houston chapter of the National Contract Management Association (NCMA) will sponsor a half-day workshop on "Rights in Technical Data and Patents" starting at 8:15 a.m. in the Rec Center, Rm. 204. Ed Fein and Russ Schlorff from the JSC Patent Counsel office will be the featured speakers. The workshop is free, but advance reservations are urged. The NCMA monthly luncheon will follow the workshop with New Initiatives Office Manager Bill Huffstetler as speaker. For reservations, call Mitzi Broyles, x38524.

Weight safety—A required course for employees wishing to use the Rec Center weight room, it will be offered from 8-9:30 p.m.

Cafeteria menu—Entrees: barbecue smoked link (special), turkey and dressing, beef stroganoff, chicken noodle soup. Vegetables: lima beans, buttered squash, Spanish rice.

Aug. 19

Cafeteria menu—Entrees: meat sauce and spaghetti (special), baked scrod, liver and onions, fried shrimp, seafood gumbo. Vegetables: green beans, buttered broccoli, whipped potatoes.

Aug. 20

Defensive Driving—A course in defensive driving will be offered from 8 a.m.-5 p.m. at the Rec Center. Cost is \$20. For more information, call x30304.

Aug. 21

Family fun day—The JSC-EAA will

sponsor a family fun day at AstroWorld from 10 a.m.-10 p.m. Admission is \$9.95 per person with an EAA coupon.

Aug. 23

Mixed bowling league—Team captains of the NASA Mixed Bowling League will meet at 5:30 p.m. in the Rec Center, Rm. 207, to discuss the upcoming season. New bowlers are welcome. For information, call Chuck Welch, x38634, or Leona Kain at 282-2544.

Aug. 24

NMA meeting—The NASA JSC chapter of the National Management Association (NMA) will meet, starting with a social hour at 5 p.m. and followed by dinner at 6 p.m. in the Rec Center Ballroom. Jim "Mac" McInvale of Gallery Furniture will speak. For information, call Ann Hammond, x32933.

Aug. 25

Softball tournament—Registration deadline for teams to sign up for the Men's Open C softball tournament scheduled Aug. 27-28 is at 5 p.m. Only the first 14 entries will be accepted. Cost is \$95. Call x30304 for details.

Aug. 26

SEDS conference—The Texas area chapters of the Students for the Exploration and Development of Space will sponsor an international conference at the Nassau Bay Hilton through Aug. 28. The conference will feature JSC tours, a space career exposition and several well known speakers from the space industry. For

more information, call Peter Lange, x30850.

Aug. 29

Space '88—A Space '88 Conference focusing on engineering, construction and operations in space will be Aug. 29-31 at the Hilton Hotel in Albuquerque, N.M. The program will include the presentation of more than 130 contributed papers on topics such as extraterrestrial operations, orbital operations and specialty operations. Speakers will include John Aaron, chief of the NASA Office of Exploration, STS 61-B Mission Specialist Woody Spring, Dr. Michael Duke, program manager for construction experiments in space, former U.S. Senator and Apollo astronaut Dr. Harrison Schmitt, and Barney Roberts, manager of the JSC Exploration Studies Office. For more information, call Ray Leonard at (505)455-3484.

Sept. 9

AIAA China trip—A technical delegation from the Houston Section AIAA will depart for a trip to China to visit with the Chinese Society of Astronautics. Participants will meet with technical counterparts in Chinese space facilities at Beijing, Xian and Shanghai, home of Houston's sister section, the Shanghai Astronautical Society. Non-technical activities are planned for spouses. The delegation also will visit scenic and historic sites at Guilin and Hangzhou. For information on applications, call Jim McLane, 488-0312.

JSC

Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2.

Property & Rentals

Lease: El Lago, Pebblebrook condo, 1 BR, W/D, ceiling fan, tennis, pool, private entrance, nice, avail. mid-Aug., \$325. Chris, 282-2667 or Aggie, 280-1989 or (409) 925-8593.

Lease: Egret Bay condo, 2-2-2 CP, W/D, FPL, fans, \$390/mo. and ref. 486-8551.

Rent: West Galveston beach house, 2-2, beach 100 yards, boat landing, marina w/pool, \$500/wk., weekend rates avail. Fendell, x31206 or 538-1147.

Sale: College Station, mobile home, 2 mi. south of A&M off Welborn Road, convenient, safe, private. Terry White, 332-5177.

Sale: Kirkwood South, large custom 2-story, 4-2-2, 2,400 sq. ft., formal, family room, FPL, study, intercom, oversized cul-de-sac lot, near Dobie H.S., \$76,500. 488-5210.

Sale: La Porte, Fairmont Park, 3-2-2, \$3,000 equity, no qual. assum., low closing, \$630/mo., fixed 10%, 471-8776.

Sale/Lease: Forest Bend townhouse, 2-1-5-2 CP, storage rm., W/D conn., refrig., patio, \$375/mo., or \$45K. 482-2138.

75 double-wide mobile home, 24x45, 3-2, central A/H, ex. cond., \$14,900. Dick, 280-7411 or 332-3678.

Sale: Cemetery lot, 3 spaces, Forest Park East, League City, w/monument privileges, \$2,000. Nita, x33852.

Sale: Big Bend area hunting land, 160 acres, \$170 per acre, OBO. 337-4051.

Sale: Inside lot at Rayburn Country, Jasper, Tex., 80' x 200'. 645-0008.

Sale: Heritage Park, 3-2-2, custom kitchen cabinets, new vanities in baths, mini-blinds, new paint, new tile baths, atrium, fenced and decked yard, many extras. Lori or Tony, x32304 or 482-5139.

West Galveston beach house, 3-2 central A/C, week/day/mo. Ed Shumilak, x37686 or (409) 744-1376.

Cars & Trucks

Jeep Cherokee Laredo, black 4x4 4 dr., loaded, 21K mi., ex. cond., \$13,500 W/O stereo. Jeff, x34338 or 943-7754.

'80 Olds Toronado, all power, new trans., paint and license, AM/FM stereo, A/C, \$2,650, OBO. 339-1957.

'85 Chevrolet Celebrity, 24K mo., \$4,900. 538-1544.

'87 Chevrolet Cavalier, 2 dr., 5 spd., P/S, A/C, AM/FM/cass. stereo, silver w/black int. Laurie, x39173 or 488-3647.

'87 Camaro Rally Sport, P/B, P/S, A/C, AM/FM/cass. stereo., 6,500K mi., ex. cond., \$9,950. Ray, x31484 or 280-8563.

'80 Toyota Tercel, 3 dr. h'bk, auto., A/C, AM/FM/cass., 69K mi., ex. cond., \$1,900. Bansal, x35025 or 488-5989.

'77 Chevrolet pickup, A/C, auto., new brakes, good tires, tilt steering, cruise, runs good, \$1,100. 996-1911.

'85 Cadillac Brougham d'Elegance, burgundy

w/leather int., ex. cond., \$13,600, OBO. Cathy, x39450 or 559-2821.

'79 VW Scirocco, standard, AM/FM cassette, Pioneer speakers, \$1,700, OBO. Rochelle, 524-0705; '69 Chevy Camaro conv., classic, 327 CU, A/C, P/S, P/B, 95% restored to orig. cond., \$7,395, OBO. 277-0929.

'84 Chevrolet Cavalier, A/C, AM/FM stereo cass., auto., clean, 81K mi., \$2,800. Hammack, 280-5159 or 554-4078.

'85 Toyota extra cab diesel pickup, 63K mi., 34 mpg, ex. cond., \$4,900. John, x39164 or 480-6019.

'79 Cadillac Fleetwood, yellow, 4 dr., loaded, new Michelin tires, \$2,000, OBO. Libby, x30199 or 534-4017.

'85 GMC High Sierra, LWB, 305 eng., V-8, brwn./bge., loaded, P/W, PDL, P/S, P/B, A/C, stereo, C/C, custom dual exhaust, new Uniroval Tiger Paws Rally wheels, \$6,500, OBO. Tammy, x33945.

'86 Firebird, V-8, cruise, AM/FM cass., A/C, P/S, P/B, 5 spd., 27K mi., \$7,300. x31598 or 486-6762.

'85 35' Mallard motor home for rent 337-4051.

'79 Honda Accord, 4 dr., 5 spd., A/C, AM/FM cass., 77K mi., orig. owner, ex. cond., \$2,200. 729-4447.

'69 MGB, convertible, red, in good cond., orig. wire rim tires, BO. 282-3523 or 482-9604.

'69 Dodge customized 3/4 ton van, Captain's chairs, etc., low mi., ex. cond., \$2,500. Dean Thompson, 332-2229.

'88 Buick Skyhawk wagon, 4 cyl., 17 mpg, 3,700 mi., ex. cond., loaded, \$9,100. Greg, 282-4263 or 488-2082.

'83 F100 Ranger truck, 4 cyl., 4 spd., A/C, P/S, AM/FM, 70K mi., good cond., \$2,600, OBO. Johnny, x34189 or 486-7089.

'86 Cutlass Ciera, 4 dr., V-6, A/C, power, AM/FM, cruise, tilt steering, \$6,000. 532-1711.

'88 Chevy Beretta, A/C, tilt, cruise, auto. trans., aux. lighting, AM/FM stereo, elec. RR wind. defog., 2.0L EFI, P/S, P/B, front & rear carpeted floor mats, inter. wipers, Debra, 931-1651.

'80 Honda 750, mag wheels, garaged, low mi., \$1,250 or trade for "AT" class PC computer or car. x30092 or 481-3637.

Honda Shadow 500, ex. cond., \$1,500; 27" Schwinn Traveler men's bike, was \$299, now \$200. 996-1410.

'80 Honda 200 Twinstar, ex. cond., 7K. \$500; 72 Honda 450 CC, needs brakes, clutch and throttle cables, \$225. x34270 or 337-1896.

'79 Yamaha XS-1100 Special, red, ex. cond., w/two matching Bell full face helmets and a kryptonite wheel lock, \$1,500. Mike or Cindy, x39729 or 484-6979.

'83 Honda Shadow, black, tinted windshield, helmet & cover incl., low mi., ex. cond., \$1,375. Moses, x35847 or 437-6727.

'77 Honda Goldwing, less than 30K orig. mi., needs some work, full fairs and trunk, \$550, OBO. Brian, x32884 or 996-1507.

'82 Yamaha 850 S, low mi., w/helmet, sissy bar and other extras, good cond., \$900. 534-2806 or 333-7098.

'86 Yamaha, XV700 Virago, ex. cond., garaged, \$2,500, many extras. Mark, 282-4335 or 485-6251.

'85 Honda 450 Nighthawk motorcycle, low mi., ex. cond., helmet & extras, \$1,400. James

Marshall, x33586 or 996-1730.

'84 Honda Sabre, V-65, 30K mi., \$1,300. Austin, 337-1160.

Boats & Planes

17' ski-fishing boat, McClain trailer, 65hp Mercury outboard, \$2,000. 532-2082.

'83 16' Hobie Catamaran, signature model, orange rainbow sails, ex. cond., sail box, trailer, \$1,950. Karl, x35067 or 333-3544.

'36' Watkins sloop. 538-1544.

Kayak 10' collapsible to 10' x 12", good cond., \$85. x34270 or 337-2682.

17' Coleman canoe, 2 seats, paddles, \$100. Kathy, 335-8529.

16' Hobie Cat, \$1,400; 2 sets of sails, harnesses, trapeze and life jackets. John, 482-6364.

'76 27' Catalina, VHF radio, depth, knot atomic-4 inboard, complete overhaul 1986, ex. cond., \$14,500. 280-8644.

15' center console with 25hp Evinrude, galv. trailer, trolling motor, less than 100 hours on new motor, access., good cond., \$1,800. Don Thompson, x39475 or 644-5044.

'86 Starlit F2, 2 pc. AM pro mast telescopic boom; north wave full battery, 55 sq. ft. sail; several access., \$750. 333-1727.

E-Z loader boat trailer, galv., will fit 21' boat, \$900. 333-6891.

21' Bayliner w/cuddy and trailer, depth finder, ship-to-shore, V-6, 140 hrs., \$6,900. 333-6429.

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Wall unit entertainment center, brown w/cabinets, \$60. Alzena, 280-7635 or 996-9033.

21.9 cu. ft. refrig., w/ice maker, 2 dr., 4 yrs. old, almond, \$600, OBO; waterbed, super single, reduced motion mattress w/heater, mirrored headboard, rail pads, 6 drawers under, \$290, OBO. 532-1607.

Wanted

Need riders for vanpool, Bear Creek-Copperfield area to Rockwell bldgs. (555 & 600 Gemini), Joe Lewis, 282-3159.

Want Guy Clark's Greatest hits, early 1970's, record album or tape, to buy or borrow for taping. x39226.

Want ladies single speed bicycle, must be in good cond., appearance not a factor. Georgia, x34563.

Need dependable transportation from Hobby Airport area to JSC, hours 7:30 a.m. to 4 p.m. or 8 a.m. to 4:30 p.m., Mon. through Fri. x37000.

Want non-smoking carpool rider, Spring, Tx. to JSC, 7:00 to 3:30. Roy Parker, x38233 or Patnesky, x38636 or x35111.

Want 1 BR condo or apart, NASA/League City/CLC, W/D, \$250/275/mo., or \$325/350/mo., bills pd., move in approx. Oct. 1, lease period nego. Randy, 280-7328.

Rider needed, vanpool, West Loop Park & Ride to NASA. Richard, x37557.

Want repairable refrigs., freezers, A/C units, free removal. A.A. Johnson, x36580 or 339-1402.

Need ride from Meadow Bend area, will share expenses. Steve, x35521 or 334-1202.

Rock band "Powered Flight" needs a keyboardist/singer, must have equip. Tom, x33659 or Rene, x35121.

Want hot tub/jacuzzi, free removal, will trade for air conditioning or refrigeration repair. A.A. Johnson, x36580 or 339-1402.

'86 Starlit F2, 2 pc. AM pro mast telescopic boom; north wave full battery

WHICH WAY IS UP?

Preflight Adaptation Trainer should help astronauts adjust to conflicting sensory inputs

By James Hartsfield

Teaching astronauts to rely more on their eyes and less on their inner ears for a sense of balance may reduce the risk of space sickness, and a JSC team is striving to create a classroom that can do just that.

Work on the Preflight Adaptation Trainer (PAT) has been under way since 1984, said Dr. Deborah Harm, PAT project scientist. The project's aim is to create an environment on the ground that simulates the effects of weightlessness on the sense of balance, thus providing a trainer in which astronauts can slowly adapt to the effects of microgravity—before they go into space. PAT is a project in the Space Biomedical Research Institute of the Medical Sciences Division. Dr. Donald E. Parker of Miami University, the project's principal investigator, developed the concepts.

Space sickness, similar to terrestrial forms of motion sickness in most of its symptoms, is caused at least in part by sensory conflict, Harm said. Sensory conflict means that all the sensory cues that tell the brain about the body's position and movement in space don't match, and this can create unusual sensations.

In weightlessness, for example, what looks like "up" may not feel like "up." On the ground, if your car is stopped and the car next to you starts moving forward slowly, you may feel as if you're moving, she explained.

In short, astronaut's bodies literally can't believe what they feel about their motions in space, because what they see and what they feel are not the same.

Microgravity can play havoc with the workings of the inner ear, specifically with the otoliths, tiny, stone-like calcium deposits that allow us to tell if we are tilting and whether we are moving forward, backward or sideways. Otoliths rest on a bed of gel-like fluid in our inner ears, and the pressures they exert on the nerve receptors in that gel as they slide across it tell us a lot about our head and body position and movement.

In microgravity, the otoliths don't exert the correct pressures, and the results are strange. In space, a tilt of the head can sometimes be translated by the inner ear to make astronauts feel as if they're moving sideways. But their eyes tell them they are only tilting, and the conflict of perceptions can make them ill.

"When you tilt your head or your body, you don't get any information about tilt from your otoliths. You may get it from other sensory cues, but not from the otoliths," Harm said. "All signals from the otoliths are interpreted by the brain as linear acceleration."

The PAT attempts to duplicate this conflict of perceptions, known formally as the Otolith Tilt-Translation Hypothesis, on the ground.

Two prototype PAT trainers are now being used for research, and a third, more advanced version is being built, evolved from the research under way.

The first version appears to be little more than a flat table, where the trainee lies on his back, slowly moving his head from side to side, or lies on his side, slowly pitching his head up and down. The position and the

movement neutralize the effect of gravity on the otoliths, somewhat duplicating the lack of tilt sensations experienced in space.

But without conflicting information from the eyes, the duplication of the effect thought to cause space sickness is not complete. So the latest version of the PAT includes a chair that can be tilted from side to side or forward and backward plus three-dimensional visual effects that can conflict with the slow tilt sensations experienced.

"If the movement of the visual scene doesn't match the tilt, the person learns to suppress tilt information and rely on the visual information," Harm said. "Small tilts produce otolith signals similar to those caused by linear movement in space, so if you coordinate the tilt and visual scene movement, the person learns to reinterpret the tilt to mean linear movement."

The third PAT version, now under construction by Honeywell, will be delivered in May 1989 and will be the most technically sophisticated. It will consist of a large sphere, in which the trainee sits in a chair that can be rotated with a hand controller. Projectors above the chair will create realistic views on the inside of the sphere, views that could include the inside of the Orbiter or Spacelab. The trainer will simulate three-dimensional movement while eliminating gravity information to the otoliths, Harm said.

Space sickness can be a serious problem; about 50 percent of all astronauts experience it to one degree or another. Although its symptoms usually clear up within three days, they can range from mild to severe, she said.

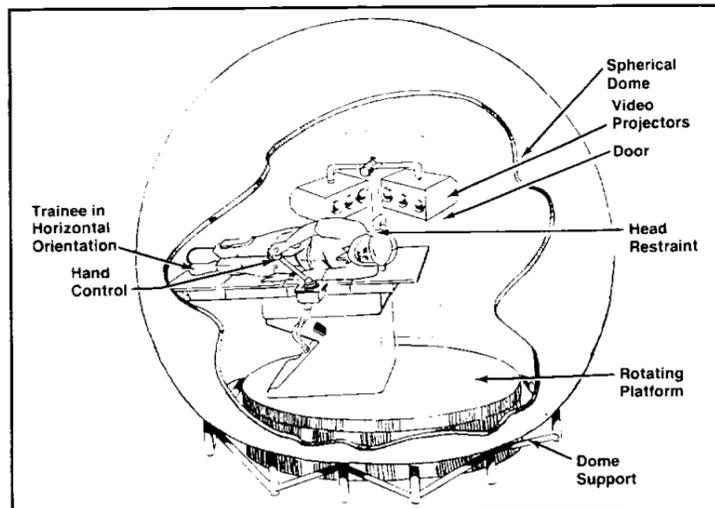
Two situations where motion sickness could affect crew safety are during extravehicular activities or in the event of a rapid turn around requiring an emergency egress from the Orbiter.

Drugs have been somewhat successful in preventing and treating it, but "training has the advantage of allowing them to adapt more quickly ... and it eliminates any side-effects of drugs," she said. Still, a lot of questions remain concerning the PAT.

"How much training is necessary? And how long do the effects of training last? Those are some of the issues we're looking at," Harm added. "We know that astronauts who've flown before and been sick are less likely to get sick a second time; there's a long-term carryover, but we don't know to what degree."

STS-26 Commander Rick Hauck and mission specialists Pinky Nelson and Dave Hilmers will help with development of the PAT by participating in various parts of a Detailed Supplementary Objective (DSO) during their mission.

The DSO will include measurements of eye movement reflexes, reports of motion perception while making head movements under controlled conditions, and a posture test. Some of the information will be collected preflight and postflight and some tasks will be done on orbit, during reentry and immediately after landing, Harm said. The DSO may help confirm the tilt translation hypothesis, she explained.



Top, Phillip Haritos, biomedical engineer trainee, sits in the second version of the Preflight Adaptation Trainer (PAT), a device that uses motion and three-dimensional visual images to simulate the effects of weightlessness believed to cause space sickness. Above: The most advanced PAT, now under construction, will simulate both three-dimensional movement and images, including images of the Orbiter and Spacelab. Left: Members of the PAT team stand in front of the second PAT; seated from left are, Kathy Duncan, scientific programmer; Dr. Deborah Harm, NASA project scientist; Linda Michaud, research scientist; and, standing, Haritos; Bill Crosier, senior biomedical engineer; Noel Skinner, research scientist; and Freddie Ferrara, junior engineer.

JSC Photos by Mark Sowa

Astronomers locate most distant galaxy yet seen

Astronomers at NASA's Space Telescope Science Institute, Baltimore, Md., and the University of California at Berkeley have uncovered the most distant galaxy yet seen.

Called 4C41.17, the newly discovered galaxy is located at an estimated distance of 15 billion light year—more than 90 percent of the distance to the visible limits of the universe.

The discovery was announced Monday by Ken Chambers, a graduate student at Johns Hopkins University; George Miley, professor of astronomy

on leave from Leiden University, Netherlands, and stationed by the European Space Agency (ESA) at the Space Telescope Science Institute; and Will van Breugel of the University of California at Berkeley.

Extremely distant galaxies are of great interest to astronomers because radiation from these galaxies takes billions of years to reach the Earth. The distance established for 4C41.17 means that what is being seen happened only a few billion years after the Big Bang, which marked the

beginning of the universe.

Such remote galaxies can be used to study the early stages of the universe. According to current cosmological theories, the physical conditions of the early universe were very different from those encountered today. Remote galaxies like 4C41.17 may help forge a better understanding of how galaxies have evolved since the time of the Big Bang.

Galaxy 4C41.17 also is intriguing because it has a fundamentally different appearance from nearby galaxies.

It and other high red-shift galaxies have unique, enigmatic properties, say the researchers. They certainly are not "normal" galaxies.

Galaxy 4C41.17 is one of several extremely distant galaxies discovered by Chambers, Miley and van Breugel during the past few months using their newly developed search strategy. Their strategy makes use of the fact that galaxies such as 4C41.17 produce intense radio emissions, millions of times more powerful than those of our own Milky Way

galaxy. The unique radio spectrum of these objects can be used to select the most powerful and most distant of them.

The researchers find that such galaxies have a distinctive radio spectrum which peaks and then drops off at a much faster rate than found in nearby radio galaxies. This "ultra-steep" spectrum indicates that the galaxies are intrinsically quite luminous, though they appear very faint because of their tremendous distances from Earth.

Electronic waiter may handle menu

By James Hartsfield

If a system developed by a JSC cooperative education student is chosen, Space Station *Freedom* may have an electronic waiter to keep track of its 14,000-item pantry and make choosing a meal as easy as saying "Please."

The Voice Actuated Inventory System (VAIS) is a project developed by David Rodriguez, an electrical engineering student from Purdue who worked this summer in the Telemetry and Audio Section of the Tracking and Communications Division. A junior, this summer was Rodriguez' second term as a JSC co-op, and his project, finished on his last day here Friday, has been installed in the Bldg. 15 Space Station mockup.

With the system, crew members would actually converse with a computer that tracks the station's inventory of food, selecting meals and snacks and checking their supplies. Commands to the computer are given with one of 27 single words, while the computer answers the user, saying, "Please choose a meal," or asking, "Would you like to choose a meal or check inventory?" The computer's voice is a recording of Rodriguez. Although it may not be the most stimulating dinner conversation, it could be the most practical.

Many inventory systems are being studied for Space Station, including bar coding of food or a touch screen computer system. But a voice-actuated system may be the simplest to operate, Rodriguez said. "It provides for hands-free operation," he explained. "And the microgravity action and reaction forces don't come into play."

The system now in the Space Station mockup is only a model of what VAIS may become once its vocabulary is expanded and the



David Rodriguez talks to the Space Station mockup's menu system computer in Bldg. 15.

system refined. "But I hope it will be a working model for any type of inventory system that goes up," Rodriguez said. "The best thing about this project is that there are so many people excited about it, people working on foods, inventory, voice control and in the mockup."

Putting VAIS together was a difficult chore, but the long hours were worth it, he added. "The whole time, I was enjoying what I was doing, and that makes it fly by a lot faster," he said. "It's a leading edge of technology. I learned a lot about voice recognition, and that's useful."

VAIS may be one of the most user-

friendly voice recognition systems yet developed at JSC, since Rodriguez used two male voices and two female voices to program the computer's recognition of commands, said Bill Jordan, technical assistant to the chief of the Tracking and Communications Division.

"He did an outstanding job with it. The technology of voice recognition is still more of an art than a science, but he built up the software with an effort to solve some of the problems," Jordan said. "The real test is going to be leaving it in the mockup for a while and seeing what people think of it."

NASA buys second Shuttle carrier jet

By Jeff Carr

JSC has signed a definitive contract with Boeing Military Airplanes of Wichita, Kan., to modify a Boeing 747-100 for use as a second Shuttle Carrier Aircraft (SCA).

Space Shuttle Orbiters are ferried "piggy-back" atop the SCA from any Shuttle landing site to orbiter processing facilities at the Kennedy Space Center. The additional SCA will provide backup ferrying capability and eliminate a potential single-point failure in the Space Transportation System.

NASA announced plans to acquire

a backup SCA in February of this year. The airplane selected is nearly identical to the original SCA which will minimize costs associated with modifications.

The work will be accomplished at Boeing facilities in Wichita and will include structural modifications to enable attach pylons to be mounted atop the aircraft and additional changes to permit better flight control during ferry flights. The agreement calls for delivery of the backup SCA in October of 1990.

The cost-plus-fixed fee contract is valued at \$55 million.

Test firing big stride

(Continued from Page 1)

The next immediate step toward launching *Discovery* will be the repair of a tiny nitrogen tetroxide leak in the Orbiter's Reaction Control System, located in the left Orbital Maneuvering System (OMS) pod. The leak, located in a dynatube fitting, an in-line joint on a line used to vent the oxidizer tank, will be repaired using a clamshell-like device filled with sealant, Utsman said.

The clamshell device, developed at JSC, will be clamped over the leaky fitting and filled with a sealant. An access hole, about 15 inches in diameter, will be cut in the aft payload bay wall of the Orbiter to allow

technicians to reach the area. Once repairs are finished, the access hole will be closed with a removable panel, which will allow future servicing and checks of the area. "It's not a chain-saw massacre," Utsman said. The repair work should begin by Thursday.

Meanwhile, the final solid rocket motor (SRM) test before STS-26, Production Verification Motor 1 (PVM-1), has been moved up from its originally scheduled date of Aug. 20 to noon CDT Thursday. The two-minute, full-duration test firing of a solid rocket will be conducted by Morton Thiokol at its facility near Brigham City, Utah.

Crucial firing boosts spirits

(Continued from Page 1)

Dan Brandenstein, chief of the Astronaut Office, also emphasized the work still left to be done, but added that the flight is moving closer each day. "Vehicle processing will continue toward the launch of STS-26 with a safe return to flight our number one priority. We're moving down that road with a great deal of confidence," Brandenstein said. "And when the vehicle is ready, the crew of *Discovery* will be ready to go."

Following the FRF, the top priority for *Discovery* is the repair of an oxidizer leak in the Orbital Maneuvering System pod, and repair of that leak is planned using a method developed at JSC. Pohl said he is proud of the JSC engineers' efforts.

"It was a magnificent team effort by the engineers. Engineers, by nature, by trade, are problem-solvers; they love to solve problems. And this was a problem just begging for a solution," Pohl said.

Correction

On Page 1 of the Aug. 5 edition of the Space News Roundup, two pictures that accompanied an article on the Professional Development Program were misidentified. A picture of Dr. Michael W. Bungo, director of the Space Biomedical Research Institute, was wrongly identified as Donald Morrison of the Experimental Planetary Branch in the Solar System Exploration Division. And a photograph of Morrison was mistakenly identified as Bungo.

Ice cream fuels freeze-off for Propulsion and Power

About 130 people "beat the heat" at the Propulsion and Power Division's recent Second Annual Ice Cream Freeze-Off at Challenger 7 Memorial Park.

Joe Trevathan of the Thermochemical Test Branch won the grand prize, a perpetual trophy, for the best overall ice cream with his homemade vanilla and fresh strawberry entry.

The team from the division office took the prize for best taste with Strouhal's BB Strawberry Ice Cream.

With headgear borrowed from Blue Bell and Texas Gold, the Buckethead Team won the award for most originality. The Three Bears team won the team spirit prize.

Division Chief Chester Vaughan presented the awards. The judges were Henry Pohl, director of engineering, Bill Huffstetler, head of the New Initiatives Office, and Cyndi Draughon, Engineering Directorate administrative officer.



The Three Bears team shows its winning spirit. From left to right are John Masetta, Rex Delventhal and Ken Kroll.

Lost items caretaker finds work gratifying

(Continued from Page 1)

her purse, and I tracked her down through the car rental; caught up with her in San Antonio. She spoke no English. Her sister lived in Houston; she came and picked it up. She got her money back. People need these things. Like, look at this wallet here, this license is from New Zealand. The airlines are real helpful, the car rental, hotels. They all want to help."

Baseball bats. Thousands of items pass through Henderson annually. Lawn sprinklers, mud flaps. About 30

percent of those items are reunited with their owners. Make-up kits, watches, jewelry. But 30 percent is not enough.

"I don't think enough people are really aware that I'm here. I guess that's why I'm doing this, to expose the lost and found a little bit. If you lose something, call me. Bldg. 45, Rm. 211, extension 31993. I keep a log on all the calls, and I log all the items turned in, where and when they were found. I'll keep items here as long as six months, longer if they're

really valuable. But people sometimes don't remember they've lost something. Like umbrellas, when it rains, I get lots of calls for umbrellas."

Pride. People often are amazed that what they have lost awaits them in lost and found. Honesty. By far, all of the wallets turned in have the correct amount of cash, and coin purses are turned in with 50 cents inside. Loose change is even turned in. When things are claimed, the owners are surprised. And the thanks. No one knows quite like

Henderson does that the best thing about being lost is being found.

"To me, within myself, it's a very gratifying thing. People are very honest about turning things in. We have honest people, and that motivates me more. It's all free; I don't get rewards. My name's not on the letters we send out; I work sort of behind the scenes. I get calls, oh yes, and letters. That lady from Mexico called me three times to say thank you. That's my reward. That's my job."

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